Detroit Diesel Series 50 Propane Engine Development, Certification, and Demonstration Project

Subcontractor

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3/95–6/96

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Objective

To develop, certify, and demonstrate a dedicated propane (LPG) heavy-duty engine (DDC Series 50G/LPG) for transit bus and heavy-duty truck applications. The dedicated propane engine should provide competitive energy efficiency (maximum thermal efficiency greater than 38% at high load points) to diesel engines while meeting the following low engine emission standards:

Corpus Christi transit bus for demonstrating the DDC Series 50 propane engine.

Engine Emission Targets (with Oxidizing Catalyst) (g/bhp-h)

NOx	**THC** (Hydrocarbons)	**CO**	**PM** (Particulates)
2.5	1.0	2.0	0.05

The engine will be rated at 275 HP at 2100 RPM with peak torque of 890 FT-LB at 1200 RPM.

Approach

To meet our emissions and horsepower goals, the LPG engine development work will include some engine modifications such as compression ratio and combustion chamber design, piston and ring design, cylinder head and valve seat design, and selection of specific engine components (fuel delivery system, engine control system, fuel injectors, turbocharger, etc.) for LPG use. After we have designed and fabricated the Series 50 LPG engine, the engine will undergo mechanical durability and reliability testing. A series of tests will be conducted to ensure

the engine components meet their durability and reliability objectives (approximately 400,000 miles). Then a preproduction version of the DDC Series 50G/LPG engine will undergo complete emissions certification and deterioration testing. The engine will incorporate all additional engine and aftertreatment modifications that resulted from the durability testing.

For the demonstration part of the project, host sites (primarily transit properties) will be identified. Each host site will receive two or three prototype engines with factory support. The engines will be installed in either new or current vehicles (transit buses, airport shuttles, etc.) and operated for at least 1 year. Data will be collected on vehicle operation, fuel consumption, maintenance costs, and overall operating costs.

Accomplishments

Initial engine development work has taken place. Problem areas (such as fuel delivery, fuel control, and combustion chamber design) have been determined. Preliminary determination of the host sites (Corpus Christi, Texas; Denver, Colorado; and Halifax, Nova Scotia) has been made.

Future Direction

To have the most up-to-date technology and to meet the project's schedule requirements, Detroit Diesel Corporation plans to engage in an ongoing consultation with propane industry experts.

Publications

None to date.